IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application for:

WIRELESS STREAMING AUDIO SYSTEM

Inventor(s): Michael Shawn Giffin

Shuichi Takagi

Docket Number: SNY-P4260

Prepared By: Miller Patent Services
29 Seminole Drive
Ringwood, NJ 07456

Phone: (973) 728-2760
Fax: (973) 728-0438
Email: miller@patent-inventions.com

1
2
3
4
5
6
7 **WIRELESS STREAMING AUDIO SYSTEM**
8
9
10 **FIELD OF THE INVENTION**

This invention relates generally to the field of audio systems. More particularly, this invention relates to methods and apparatus for providing remote storage of audio files and wireless streaming audio playback.

BACKGROUND OF THE INVENTION

Storage devices for storing electronic data such as music files have steadily decreased in size and cost while increasing in storage capacity over the years. Such devices as Compact Discs, and flash memory cards such as the Sony Memory Stick™ have made it possible to store high quality audio files for playback very conveniently by the user. However, it remains impractical for the user to take full advantage of a library of music using such storage mechanisms while remaining mobile. Even with the smallest and most dense storage media, a substantial library of music is impractical to carry around with the user. This is especially true if the user is traveling on foot, bicycle or using public transportation where storage space and convenience can become a major limitation to the amount of music that one can readily carry. This is particularly true if the user is carrying a music player along with a personal digital assistant, cellular telephone and other possessions.

SUMMARY OF THE INVENTION

1
2   The present invention relates generally to audio systems. Objects,
3   advantages and features of the invention will become apparent to those skilled in
4   the art upon consideration of the following detailed description of the invention.

5   In certain embodiments consistent with the present invention a wireless
6   streaming audio system and method is provided. A user subscribes to a service
7   for storage of music files on a server at a data center. The music files may be
8   uploaded from the user or obtained by the data center from a commercial music
9   source. The user may play back the stored music at a wireless music player by
10   requesting transmission of the music by the data center. The data center then
11   provides a wireless transmission of streaming audio data to the music player for
12   real time or near real time playback. The music player is freed of the need for local
13   storage of music files and may be readily incorporated into a cellular telephone or
14   other wireless communication device. In other embodiments, the music player
15   may be implemented as a stand-alone music player device.

16   A method consistent with an embodiment of the invention, includes storing
17   a music file for a user; receiving a request from the user for playback of the music
18   file; and transmitting the music file to the user for playback, using wireless
19   transmission, as a streaming music file. The method may further include receiving
20   from the user a request to store the music file; and wherein the storing is carried
21   out as a response to the request to store the music file.

22   An electronic storage medium storing instructions which, when executed on
23   a programmed processor, carry out a method consistent with an embodiment of the
24   invention including storing a music file for a user; receiving a request from the user
25   for playback of the music file; and transmitting the music file to the user for
26   playback, using wireless transmission, as a streaming music file.

27   A data center consistent with an embodiment of the invention includes a
28   content server that stores music files for plurality of users. A request is received
29   from the user for playback of the music file. The music file is transmitted to the
30   user for playback, using wireless transmission, as a streaming music file.

1   Preferably, the data center receives from the user a request to store the music file, and wherein the storing is carried out as a response to the request to store the music file.

A music player consistent with an embodiment of the invention includes a wireless receiver for receiving transmission of streaming data. A streaming audio decoder, coupled to the wireless receiver decodes the streaming data into analog audio signals. An audio circuit converts the analog audio signals into audible sounds. The music player may also have a user interface that receives user commands, and a wireless transmitter for transmitting the user commands to a data center to direct the data center to transmit the streaming data.

A method of operation of a wireless music player, consistent with an embodiment of the invention, includes receiving a user input for playback of a music selection; transmitting a request to a data center for the music selection; receiving a streaming data file representing the music selection; decoding the streaming data file to produce an audible representation of the music selection; and playing the audible representation of the music selection for the user.

The above summaries are intended to illustrate exemplary embodiments of the invention, which will be best understood in conjunction with the detailed description to follow, and are not intended to limit the scope of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of the invention believed to be novel are set forth with particularity in the appended claims. The invention itself however, both as to organization and method of operation, together with objects and advantages thereof, may be best understood by reference to the following detailed description of the invention, which describes certain exemplary embodiments of the invention, taken in conjunction with the accompanying drawings in which:

1   FIGURE 1 is a block diagram illustrating a system for remote storage of

2   music files and wireless playback by streaming audio according to an embodiment

3   consistent with the invention.

4   FIGURE 2 is a flow chart illustrating a process consistent with an

5   embodiment of the invention.

6   FIGURE 3 is a block diagram of a music player consistent with an

7   embodiment of the present invention.

8

9   ## DETAILED DESCRIPTION OF THE INVENTION

10   While this invention is susceptible of embodiment in many different forms,

11   there is shown in the drawings and will herein be described in detail specific

12   embodiments, with the understanding that the present disclosure is to be

13   considered as an example of the principles of the invention and not intended to limit

14   the invention to the specific embodiments shown and described. In the description

15   below, like reference numerals are used to describe the same, similar or

16   corresponding parts in the several views of the drawings.

17   Turning now to FIGURE 1, a block diagram of a system for remote storage

18   of music files and wireless playback by streaming audio according to an

19   embodiment consistent with the invention is shown as 100. In the embodiment

20   illustrated, system 100 provides a customer with the ability to store personally

21   owned music or music from a commercial music source 104 (e.g., a record

22   company or recording artist) at a data center 108 for playback at a later time from

23   any suitable location on a music player 110 using a wireless transmission of

24   streaming audio. In accordance with this embodiment, a user may own rights to

25   music (e.g., by purchase or by his or her own creation) that the user stores on

26   electronic storage media within, or playable on, his or her personal computer

27   system 116. In order to conveniently have access to this music, the user can utilize

28   a wireless device incorporating a music player 110 (e.g., a dedicated personal

1   music player, a PDA, a cellular telephone device or a multifunction device
2   incorporating the music player).

3   In this embodiment, the customer (the terms "user", "subscriber" and
4   "customer" can be used somewhat interchangeably herein) subscribes to a service
5   provided by the data center 108 for storage of his or her personal library of music.
6   The customer (or approved users) can then upload music files for storage to the
7   data center 108 via the Internet 120. At the data center 108, these music files are
8   stored on a content server 124 for future access by the user.

9   When the user wishes to play back the music stored at content server 124,
10 a request is sent to the data center, preferably by the music player 110 using
11 wireless communication, through a nearby transmitter/receiver site 130 which may
12 be coupled to the data center 108, for example, through a wireless data network
13 136 (which may include wired and wireless connections) such as a cellular
14 telephone network or other similar infrastructure. When the data center 108
15 receives a valid request for playback, the content server 124 streams real time or
16 near real time audio back to the user through the wireless network 136 and nearby
17 transmitter/receiver site 130 to the music player 110. The music player may then
18 play back the audio in real time or near real time, thus providing the user with
19 access to this music at any location within range of an appropriate transmitter
20 receiver site 130.

21 In another variation of the invention, the user may not only upload music
22 from a personal library as just described for remote wireless access, but may also
23 use the content server 124 at the data center 108 for storage of music files provided
24 by a commercial music source 104 such as a record company. In this
25 embodiment, the user requests that the data center 108 obtain and store a
26 particular music selection. The data center 108 then requests the music from a
27 suitable commercial music source 104 and obtains the files via an electronic
28 transfer from the music source 104 for storage on content server 124. The data
29 center 108 then pays royalties to the commercial music source 104 (or to a royalty
30 agent) and passes along fees to cover the royalties on to the subscriber. Since the

1   data center 108 may purchase rights to a particular selection for numerous

2   subscribers, they may be able to obtain reduced royalty rates that can result in

3   savings that may passed on to the subscriber. Also, since multiple users may wish

4   access to a particular selection, the music selection need only be stored once in

5   content server 124 with access to the selection mapped to users who contribute to

6   the royalties (or are otherwise entitled to access the selection, e.g., by virtue of a

7   flat rate subscription). Any number of fee structures can be devised for the

8   implementation of various embodiments of the present invention.

9   The actions of the data center 108, as will be appreciated by those skilled

10   in the art, are preferably implemented using a programmed processor forming a

11   part of, or connected to, content server 124. The program steps for carrying out the

12   data center 108 actions may by stored on any suitable electronic storage medium.

13   In accordance with the embodiment illustrated in **FIGURE 1**, the

14   transmitter/receiver site 130 may be part of a cellular telephone or other wireless

15   telephone network (or a data network or other communication network) and the

16   streaming audio may be provided by any suitable Wireless Application Protocol

17   (WAP) that is able to support a suitable data rate for acceptable quality audio.

18   However, other wireless communication arrangements can be used including blue

19   tooth for use in smaller areas (e.g., a home network) or using a dedicated wireless

20   network may be provided for distribution of the data. As will be seen later, the

21   circuitry required to implement the present invention at the music player 110 may

22   be a minimal addition to many existing electronic communication devices such as

23   PDAs and cellular telephones, lending itself to easy incorporation into such devices

24   to not only eliminate the need to carry a collection of stored music, but also to

25   eliminate the need to carry a separate player.

26   The process described above is illustrated as process 200 of **FIGURE 2**

27   starting at 204. At 208, a customer subscribes to a music storage and streaming

28   service provided by the data center 108 as illustrated in **FIGURE 1**. From the

29   customer perspective, the services of the data center 108 and the music player 110

1   are idle until the customer makes a request at 212. If the request is to store music

2   at 216, the customer request for music storage is sent to the data center 108 at

3   220. The data center 108 receives the request at 224 to store an audio selection

4   for the customer. At 228 the data center 108 stores the music files for the

5   customer. The files can be received either from a customer download or obtained

6   from a commercial music source such as 104. The customer may then (depending

7   upon the subscription arrangement) be charged a fee by the data center 108 based

8   upon the amount of data, or number of files or other criteria for data storage. If

9   such a fee is charged at 234, it is accumulated in the customer subscription for the

10   next billing cycle at 208 and the system awaits the next customer request at 212.

11   If the request at 216 is not for storage of music files, control passes to 240

12   to determine if the request is to playback music. If the request is for music

13   playback at 240 the customer request is sent to the data center 108 at 244. The

14   data center 108 receives the request to streaming audio selection to the customer

15   at 248. Assuming the customer request is valid, the data center 108 sends

16   streaming audio files via a wireless channel to the customer at 252. At the music

17   player 110, the music player 110 receives the streaming music file and plays back

18   the music for the customer at 258 in real time or near real time. The customer may

19   again be charged based on usage at 264 (depending upon the subscription

20   arrangement) which is accumulated in the next customer subscription billing cycle

21   at 208. In the event the request at 240 is not for playing music, other request

22   handling such as account management may be handled at 270.

23   Referring now to **FIGURE 3**, an embodiment of a wireless music player 110

24   is illustrated. In this embodiment, only the circuitry used for the music player 110

25   is illustrated. However, those skilled in the art will appreciate that music player 110

26   may be incorporated within a cellular telephone or other device without departing

27   from the invention. Music player 110 includes a wireless transmitter/receiver 304

28   that receives and transmits data through an antenna 308. When receiving

29   streaming music data, wireless transmitter/receiver 304 passes received data to

30   a streaming audio decoder 312 for decoding. Streaming audio decoder 312 may

1   decode compressed streaming audio files such as MP3 or ACC files. Streaming

2   audio decoder 312 may incorporate or utilize a separate cache memory 316 to

3   facilitate providing continuous music to the user in the event of momentary

4   dropouts in the wireless transmission. Moreover, streaming audio decoder 312

5   may be implemented as either hardware or software without departing from the

6   present invention.

7   Decoded streaming audio from streaming audio decoder 312 is passed to

8   an audio amplifier circuit 320 which in turn drives one or more audio transducers

9   such as those incorporated in headphones 326 to provide the user with audible

10   music. Music player 110 also incorporates a suitable user interface 340 coupled

11   to a control processor 344 such as a microprocessor having associated program

12   memory 350. When the user wishes to control the playback or send a request to

13   the data center 108, the user does so utilizing the user interface 340. Such a

14   request is then processed by the processor 344 and passed on to transmitter

15   portion of all of wireless transmitter/receiver 304 for transmission using antenna

16   308. Control processor 344 may also be utilized to effect various controls over the

17   wireless transmitter/receiver 304, streaming audio decoder 312 and audio amplifier

18   circuit 320, and may be interconnected thereto, for example, using a multi-wire bus

19   arrangement as illustrated.

20   Those skilled in the art will appreciate that music player 110 includes a

21   plurality of components that may already be present in some form within various

22   electronic devices such as a PDA or a cellular telephone. In general, streaming

23   audio decoder 312 (implemented as either hardware or software) and modifications

24   to the user interface 340 and a control program stored in program memory 350

25   could be the major modifications required to certain existing electronic devices in

26   order to implement the present invention.

27   Those skilled in the art will recognize that the present invention has been

28   described in terms of exemplary embodiments based upon use of a programmed

29   processor within the music player 110 as well as the data center 124. However,

30   the invention should not be so limited, since the present invention could be

1   implemented using hardware component equivalents such as special purpose

2   hardware and/or dedicated processors which are equivalents to the invention as

3   described and claimed. Similarly, general purpose computers, microprocessor

4   based computers, micro-controllers, optical computers, analog computers,

5   dedicated processors and/or dedicated hard wired logic may be used to construct

6   alternative equivalent embodiments of the present invention.

7   Those skilled in the art will appreciate that the program steps used to

8   implement the embodiments described above, at both the data center 108 and the

9   music player 110, can be implemented using various forms of storage including

10   Read Only Memory (ROM) devices, Random Access Memory (RAM) devices;

11   optical storage elements, disc drives, magnetic storage elements, magneto-optical

12   storage elements, flash memory, core memory and/or other equivalent storage

13   technologies without departing from the present invention. Such alternative storage

14   devices should be considered equivalents.

15   The present invention is preferably implemented using a programmed

16   processor executing programming instructions that are broadly described above in

17   flow chart form and can be stored on any suitable electronic storage medium.

18   However, those skilled in the art will appreciate that the processes described above

19   can be implemented in any number of variations and in many suitable

20   programming languages without departing from the present invention. For

21   example, the order of certain operations carried out can often be varied, and

22   additional operations can be added without departing from the invention. Error

23   trapping can be added and/or enhanced and variations can be made in user

24   interface and information presentation without departing from the present invention.

25   Such variations are contemplated and considered equivalent.

26   While the invention has been described in conjunction with specific

27   embodiments, it is evident that many alternatives, modifications, permutations and

28   variations will become apparent to those skilled in the art in light of the foregoing

29   description. Accordingly, it is intended that the present invention embrace all such

1 alternatives, modifications and variations as fall within the scope of the appended

2 claims.

3   What is claimed is:

4

5